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A COMPARISON OF THE COMPETENCE IN ALGEBRA OF THE GRADE IX STUDENTS OF THE EDMONTON PUBLIC SCHOOLS IN 1938 AND 1959

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For more than a decade public education in Canada has been the object of a critical attack of unprecedented concentration. The critics have charged that the three Rs have been neglected, that curricula have been cluttered with "frills", that courses have been "watered down", that "social adjustment" has been substituted for learning, that "Progressivism" has eaten like rot into the foundations of education, and that the schools have been turning out a sub-standard product, deficient in the skills of reading, writing, spelling and calculating. On the other hand, defenders of the system, chiefly professional educationists, have denied most of these accusations, describing them as being based on ignorance, emotional thinking and unreasonable prejudice. These opposing factions have been so persistent and vocal that governments have been obliged to pay attention to them, with the result that Royal Commissions in four provinces have recently conducted the most comprehensive surveys of education ever to be published in this country (2), (3), (4), (7).

Yet little has been done by way of controlled, experimental studies to discover whether standards have indeed fallen, or have been maintained, or improved. The investigation here summarized was an attempt to obtain evidence, through sampling and testing, which might shed some light on one area of this still unsettled question.

The Problem and Hypothesis

It was the purpose of this study: (a) to compare the standard of competence in Algebra of the Grade IX students of the Edmonton public schools in 1959 with that of their counterparts in 1938; (b) subsequently to discover whether the apparent difference in competence was statistically significant; (c) to discuss some of the factors which may have contributed to a change in competence. Nineteen thirty-eight was chosen as the comparison year because it was approximately a generation removed from the year of the study, and because the students of that year had received their elementary schooling in the "pre-Progressive" era.

Hypothesis

The hypothesis tested was that *there is no difference in competence in Algebra between the Grade IX students of 1959 and those of 1938 in the Edmonton public school system, according to the measuring instruments employed (the 1938 Grade IX Departmental Examination in Algebra).*

A Brief Comparison of the Alberta Grade IX Courses In Mathematics, 1938 - 1959

The Courses of Study

Curriculum guides. There is a considerable contrast between the curriculum guides for Grade IX mathematics issued by the Department of Education in 1938 and in 1959. In 1938 the Department's directives and suggestions to mathematics teachers in the Intermediate School occupy only four pages of the 280-page *Programme of Studies for The Intermediate School* (9). Of this material, approximately one page is devoted to the Grade IX course, and of this page, a single paragraph of five lines contains the official statement of the purpose of the study of Algebra.

In 1959, however, the Department supplied a separate 44-page booklet (5) which set forth in some detail the objectives and principles of organization of the Junior High School course in mathematics, and recommended a number of methods of presentation. Chapter IV of this guide deals exclusively with the Grade IX course.

Objectives. There appears to have been little change in the stated objectives of the Grade IX mathematics course from 1938 to 1959. In 1938 the chief aim was to equip the students to interpret the environment rather to have them spend time perfecting techniques of computation:

Many pupils will not continue their schooling beyond Grade IX. It is not desirable, therefore, to spend their time on perfecting techniques of computation which they will seldom if ever use. It is preferable to introduce them to as wide a range of interpretative mathematics as possible . . .

Since the aim of the course is to interpret the environment rather than to give skill in computation, emphasis is placed on easy mathematical relationships expressed in the form of tables, graphs, formulas and equations (Reference 9, page 120; italics in the original)

The curriculum guide for 1959 lists these objectives for the junior high school course in mathematics:

1. To develop the ability to think clearly;
2. To develop the ability to use information, concepts and general principles;
3. To develop the ability to use fundamental skills;

4. To develop desirable attitudes, especially respect for knowledge, respect for good workmanship, respect for understanding, social mindedness, open mindedness;
5. To develop a wide range of interest and appreciation (Reference 5, page 3).

The Textbooks

The textbook used in 1938 was *Mathematics for Today*, by La-Zerte and Betz (6); that used in 1959 was *Mathematics for Canadians, Book I*, by Bowers, Miller and Rourke (1). A comparison of the two books reveals a general similarity in topical content. There are, however, notable differences in treatment and emphasis, chiefly the following:

1. The 1938 book assumes a stronger arithmetic background in the students: it introduces the Algebra without preliminaries. The 1959 book, on the other hand, contains two chapters for the review and strengthening of the pupils' knowledge of integers, fractions and decimals.

2. The treatment of the fundamental operations of mathematics is more specific and formal in the 1938 book, relatively incidental in the 1959 book.

The general impression obtained from a comparison of the two books is that the pupils who used *Mathematics for Today* in 1938 must have received more practice in algebra than did those who used *Mathematics for Canadians* in 1959.

The Measuring Instruments and the Samples

The Tests

The Algebra Test. The principal measuring instrument used in this study was the 1938 Grade IX Departmental Examination in Algebra, a one and one-half hour test covering the major topics of the course. The raw scores on this test for the 1938 samples were on file at the Department of Education. The content of the test was appropriate to the 1959 course, with the exception of one question which required the division of a quadrinomial by a binomial—a topic not specifically dealt with in the 1959 textbook. It may be noted in passing that this was by no means the most poorly answered question.

An analysis of the Algebra test showed that it was a measuring instrument mainly of manipulative skills and recall rather than of interpretative ability.

The General Test. Each year during the June examinations the the Department administers to all Grade IX students a test of general ability, formerly called a General Test. The 1938 General Test

was given to the 1959 sample as well as the Algebra test, to provide a comparison of the general competence of the two groups. It was a forty-five minute objective test which required the candidates to use both verbal and computational skills in making generalizations, drawing inferences, detecting analogies, performing calculations and solving problems. It was set up for the 1959 students exactly as it had been in 1938, except that it was mimeographed instead of printed.

The Samples

The 1938 sample consisted of 203 individuals (represented by their record cards) drawn by means of a table of random numbers from a population of 1,292 students comprising thirty-five classrooms in fifteen schools. It was approximately 16 per cent of the population. The record cards supplied the following data: sex, age, birth date, I.Q., raw score in Algebra, raw score in the General Test, year's attendance, grade repeater or non-repeater, final mathematics grading and pass category.

The 1959 sample. The selecting of this sample was dictated by considerations of practicability rather than by the requirements of scientific rigor; such is usually the case in studies of this kind. Permission to carry out the necessary testing program in the classrooms was granted with the request that the administrative routine of the schools should be disturbed as little as possible, consistent with the drawing of a satisfactory sample. Accordingly, a purposive selection of six schools was made, with a view to choosing as representative a group of students as could be obtained, with respect to socio-economic status, size and type of school, and degree of departmentalization of instruction. This method of choice is supported by the opinion of Parten (8):

... the sampling procedure should be directed more toward finding and using practical devices to avoid distorted samples than toward using refined mathematical formulas to measure chance fluctuations in sampling. ... if the choice must be made between employing a logical, non-mathematical approach which might do no more than guarantee that the sample is unbiased, and using a theoretically efficient sampling design which in practice might permit the introduction of biased errors, the author believes the former is preferable.

Fortunately, a means of testing the representativeness of the sample was available through a comparison of their scores on the 1959 Grade IX Departmental Ability Test with those of the parent population. No significant difference was found between the means and standard deviations of the sample and the population.

The sample size (481 students) was relatively the same as that for 1938—approximately 16 per cent of the population.

Scoring and Test Results

An original scoring key could not be obtained for the Algebra test, perhaps because the students' solutions and answers in 1938 were written on foolscap and no matching key could be printed. Thus the writer had no alternative but to construct his own key. However, the value of each question was shown on the test paper, and there was, in the main, an obvious correspondence between the expected answers and the designated marks. It was in a few cases only that an independent assignment of marks had to be made for the respective steps in a problem's solution, and this was done with an aim to distributing the marks with appropriate relative weight among the essential steps in the solution. The writer's judgment in making these apportionments was based on many years of experience and on several terms of service as a sub-examiner in mathematics for the Department of Education.

An official key was available for the General Test. Each correct answer was worth one mark.

Summary of Results

Table I gives the mean raw scores for the two samples on the Algebra test and on the General Test. The most notable fact revealed by these figures is that the 1959 students scored higher on the General Test but lower on the Algebra than did the students of 1938.

TABLE I
MEAN RAW SCORES AND PERCENTAGES ON THE
ALGEBRA TEST AND THE GENERAL TEST FOR THE 1938
AND 1959 SAMPLES

	Algebra Test		General Test	
	Raw Score	%	Raw Score	%
Possible score	75	100	89	100
1938 Sample	31.36	42	56.49	63
1959 Sample	26.66	36	60.78	68

Tests were carried out to discover whether the difference of the population means as determined by sample statistics was significant. These tests revealed that the difference was highly significant (at the 1 per cent level) for both the Algebra test and the General Test. It was therefore necessary to reject the null hypothesis and

to conclude that the students' proficiency in Algebra in 1959, as measured by the 1938 Departmental examination, was significantly inferior to that obtaining in 1938.

Factors Affecting the Results

Measurable Factors

Of a dozen or so factors which might be expected to have a differentiating effect on the test scores of the two groups of pupils, some are measurable to a degree while others are not subject to any useful quantitative appraisal. Table II displays the measurable factors.

There is reason to believe (limitations of space prevent explanation here) that the difference between the mean IQs of the two samples was even greater than that shown in the table. This would increase the competitive advantage indicated for the 1959 group.

Factors Not Subject to Measurable Evaluation

Subject-matter difference reflected in the test paper. It was mentioned above that there was one question on the Algebra paper of a type not dealt with in the 1959 textbook—the division of a quadrinomial by a binomial. An estimate was made of the increment to the aggregate score of the sample on this item which would probably have occurred if the students had all been prepared for it (some apparently had been). This estimate was based on the marks earned on a question of the inverse type, and was deliberately made quite liberal. The result would have raised the mean score about one half mark—certainly not enough to affect the significance of the difference of the sample means.

Another point is worthy of mention with respect to the difference of the mean scores. In 1938 it was the policy and practice in scoring all Departmental examinations to deduct marks for errors in spelling and language usage (Reference 9, page 14). No such deductions were made from the scores of the 1959 students. Hence in respect of any change of marks which might have resulted from language errors, the 1959 mean score was, if anything, higher than if the papers had been scored in 1938.

End-of-term review. It might be presumed that the extra seven or eight days' pre-test review enjoyed by the 1938 group (the 1959 students wrote the test on the 12th of June) might have contributed to their higher mean score. However, it is not likely that more than half of this extra time was spent on Algebra, the other half being spent on Geometry, in which there was a separate examination. Moreover, the attendance figures in Table II show that the effective

TABLE II
FACTORS, MEASURABLE IN SOME DEGREE, WHICH
WOULD BE EXPECTED TO INFLUENCE THE TEST
SCORES OF THE TWO SAMPLES

PART A			
Item	1938 sample	1959 sample	Expected effect
Mean I.Q.	102	109	+
Mean age	15 y. 4 m.	15 y. 1 m.	
Mean attendance	173 days	188 days	+
Mean class enrolment	37	29	+

PART B
QUALIFICATIONS OF TEACHERS

Item	1938	1959	
Number of teachers teaching Grade IX mathematics	11 (all schools)	12 (sample schools)	
B.A., B.Sc., or B.Ed. degree	4	9	
B.Ed. and a second bachelor's degree	0	2	
M.A.	1	0	
B.A., M.Sc.	1	0	$\pm?$
No Degree	5	1	
First Class or Professional Certificate	11	10	
Junior E (perm.); Standard S (interim)	0	2	

length of the school year was about two weeks less in 1938 than in 1959. It is improbable that this loss of normal instruction time would be more than made up by three or four days' final "cramming".

Change of emphasis in the teaching of mathematics. Officially the stress in mathematics instruction for the whole period from 1938 to 1959 was explicitly *not* on techniques of computation. But in 1938 this was a new philosophy. Both teachers and pupils had

been accustomed in the elementary school to regarding speed and accuracy in computation as a desirable goal, and to the use of drill to attain it. The inertia of this tradition must have carried it forward for some time. By 1959, however, the diminished emphasis on manipulative skill had had time to become incorporated into teaching practice, particularly by younger teachers who had themselves been students during this period. Moreover, the textbook used in 1959 was much more in line with the philosophy of the curriculum than was the more formal older book. Thus it seems likely that in practice there was less emphasis on manipulative proficiency in 1959 than in 1938.

Relative selectness of the populations. The net loss by drop-outs and transfers between October and June in 1938 was about 3.7 per cent of the Grade IX population; in 1959 it was about 4.1 per cent. Apparently the drop-out rate had not decreased. Further, the mean IQ in 1959 was higher than in 1938, according to the available records. The indication is that the 1959 students were not a less select group than those of 1938.

Sociological factors. It is commonly assumed that as a result of post-war prosperity in this country, a large segment of society has acquired a set of values which emphasizes materialism and self-achievement and the like. This attitude has been communicated to many young adolescents, so that they consider it stupid to be smart in school, and naive to be conscientious students. The Report of the Royal Commission on Education in Alberta comments on the prevalence of such negative attitudes:

No small part of a disinclination toward education may be traced to out-of-school influences—the home and society at large. In an era of affluence . . . individuals have become enamoured of immediate personal benefits and self-interests . . . A long series of undesirable “public” practices and attitudes are put on exhibition to school youth . . . Many young people who leave school prematurely have succumbed to influence directed at them while they were still in school. There is evidence that many complaints from employers originate in this group, whose achievement is grade X or below and whose attitudes partially reflect those of society. (Reference 2, page 41).

Certain other phenomena have appeared within the last ten years which compete with the school for the attention of the young; television and the student-owned automobile are examples. The effect of these counter-attractions on school achievement would be difficult to measure, but there is no doubt that they have helped to create an environment different from that of 1938.

Summary and Conclusions

Two main conclusions are drawn from this study:

1. There has been a significant decline in proficiency in Algebra

at the Grade IX level in the Edmonton public schools since 1938.

2. The present (1959) level of proficiency in Algebra in Grade IX is regrettably low, as measured by the 1938 Departmental examination. This verdict is based on the fact that the mean score of the 481 students who wrote the test was 36 per cent, and also on the fact that the most frequently occurring score for the majority of the test questions was zero.

The study revealed that the 1959 students possessed several advantages over the 1938 group:

1. They were brighter. This is indicated both by their higher mean IQ and by their superior showing on the General Test.
2. Their school attendance was better (188 days vs. 173 days).
3. The pupil-teacher ratio in their classrooms was considerably lower (29:1 vs. 37:1).

These advantages should have enabled them to turn in the better performances on the Algebra test. That they did not do so seems to be attributable to the following factors:

1. A curricular shift in emphasis from computational and manipulative proficiency to other aspects of mathematical learning such as the interpretation of the environment, the grasping of concepts and generalizations, the development of logical thinking and of the ability to analyse problems, and the gaining of interests, appreciations and good attitudes.

2. Although the courses for the two years were topically similar, the 1938 course contained a much larger quantity of exercise material; it therefore seems likely that the 1938 students became the more practiced and experienced algebraists.

3. Negative community attitudes may, of recent years, have been reflected in student attitudes to a degree sufficient to cause a decline in student achievement.

Evaluation and Suggestion

In conclusion, the writer wishes to present two related questions which seem especially pertinent in the light of a projected revision of the mathematics program.

1. *Is the emphasis of the present curriculum realistic?* To the writer's knowledge it has never been demonstrated that it is possible to teach or to develop, in even the bright pupil, the basic processes of analysis and the tactics of insight which are the essence of clear thinking. Algebraic techniques can and should be taught to equip the thinker with a powerful tool, but whether the thinker himself can be produced at will is a question which still awaits an affirmative answer. Again, the development of desirable attitudes,

a wide range of interests and genuine appreciations is a worthwhile aim; but these are among the later outcomes of any study rather than among the first. The development of a useful degree of computational and manipulative skill is, however, an attainable goal at the junior level, and for the younger adolescent it may well be the best one after all.

2. *Have the main objectives of the curriculum been realized to any useful degree?* Objectives are of little use unless there is some way of measuring progress with respect to them. The main area for testing should be the area of the chief objectives. In 1938 this was manifestly not the case; the instructional emphasis was applied mostly in one direction and the measuring instrument in another. Perhaps this has been true in recent years also. If there is at present no way of ascertaining whether progress is being made in the direction of the principal aims, it would seem that either a suitable testing instrument should be devised and used or that the aims should be modified.

REFERENCES

- (1) Bowers, H., Miller, N. and Rourke, R. E. K., *Mathematics for Canadians, Book I*. Toronto: J. M. Dent and Sons (Canada) Limited, and the Macmillan Company of Canada Limited, 1947.
- (2) Cameron, D. A. et al. *The Report of the Royal Commission on Education in Alberta*. Edmonton: L. S. Wall, Printer to The Queen's Most Excellent Majesty, 1957.
- (3) Chant, S. N. F. et al. *Report of the Royal Commission on Education, Province of British Columbia*. Victoria: Dan McDairmid, Printer to The Queen's Most Excellent Majesty, 1960.
- (4) Hope, J. A. et al. *The Report of the Royal Commission on Education in Ontario*. Toronto: Baptist Johnson, Printer to The King's Most Excellent Majesty, 1950.
- (5) *Junior High School Curriculum Guide for Mathematics*. Province of Alberta, Department of Education, 1952.
- (6) LaZerte, M. E. and Betz, W. *Mathematics for Today*. Toronto: Ginn and Company, no date.
- (7) MacFarlane, R. O. et al. *The Report of the Manitoba Royal Commission on Education*. Winnipeg: Queen's Printer, 1959.
- (8) Parten, M. *Surveys, Polls and Samples*. New York: Harper and Brothers, 1950.
- (9) *Programme of Studies for The Intermediate School and Departmental Regulations Relating to the Grade IX Examination*. Edmonton: A. Shnitka, King's Printer, 1935.

AN INTRODUCTION TO THE SAFRAN VOCATIONAL
INTEREST TEST AND A REPORT OF ITS
ADMINISTRATION TO UNIVERSITY OF ALBERTA,
CALGARY, FRESHMEN (1961-62 CLASS)

by

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The purposes of this article are twofold. The first is to introduce the reader to the Safran Vocational Interest Test which is soon to be published in an experimental form. The second is to provide a detailed analysis of its administration to a sample of 513 University of Alberta, Calgary, freshmen.

PART I

Purpose of the "S" Interest Test

The fundamental purpose of "S" Interest Test is to assist individuals to determine their vocational preferences in seven major vocational areas, namely (1) Economic, (2) Technical, (3) Outdoor, (4) Service, (5) Humane, (6) Artistic, and (7) Scientific.

It is anticipated that the test may replace the lengthier and costlier vocational interest tests now commonly administered in Alberta High Schools. Because the "S" Interest Test has been designed to meet the known needs of Alberta students,¹ and because Alberta samples were used in the standardization steps, it should prove an especially valuable test in this Province. If Alberta school samples are more representative of other Canadian school samples than are American samples, then it should be useful elsewhere in this country.

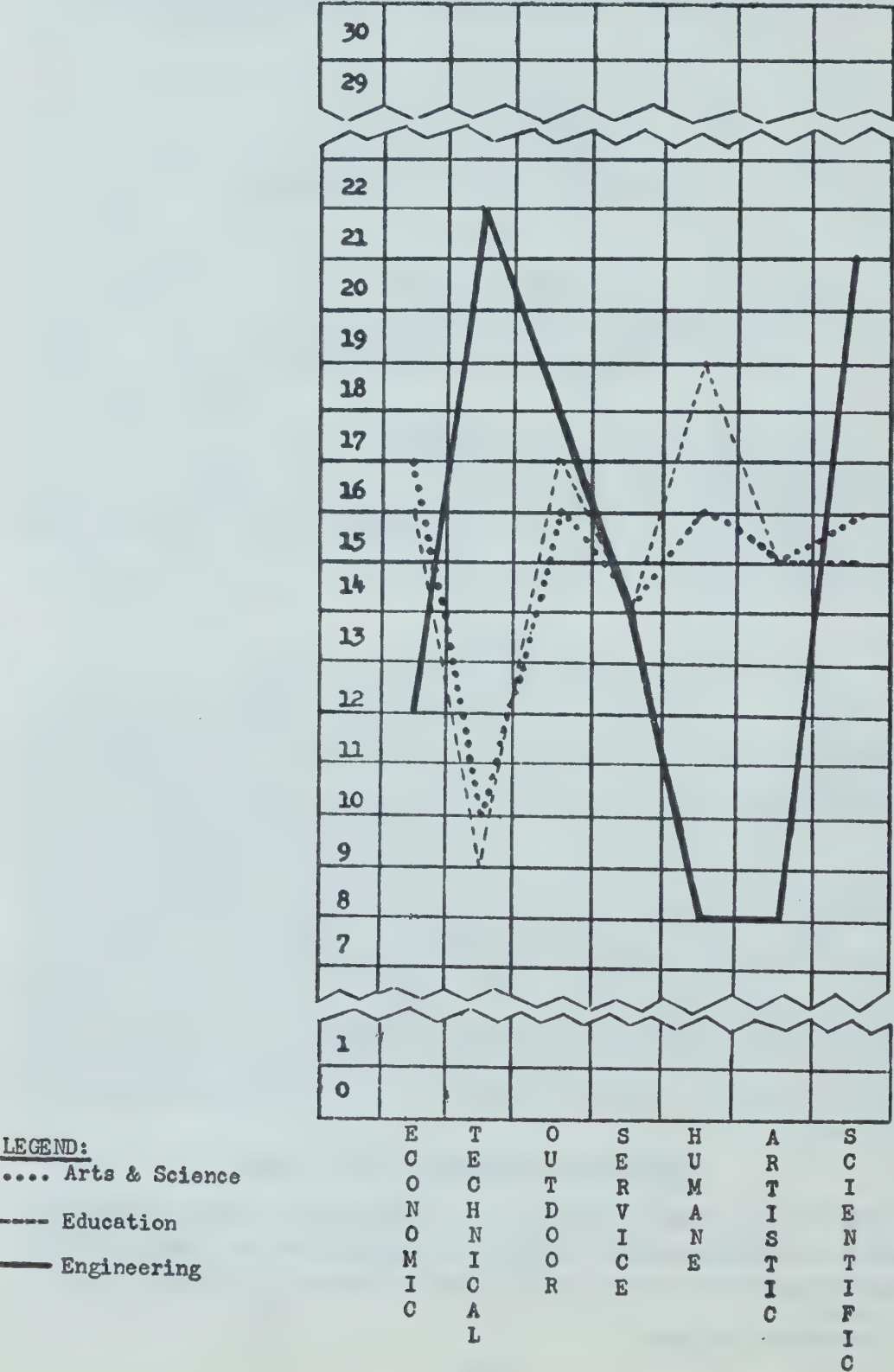
Range and Suitability of the Test

The test has been prepared for high school seniors, University freshmen, and those other young adults who are entering pre-vocational preparatory schools. It should prove especially suited to

1. See footnotes, last page.

FIGURE 1

Median Interest Profile of Arts and Science, Education and Engineering Freshmen on "S" Interest Test



their needs because of two noteworthy features. First, it serves as a rapid indication of vocational preferences. The individual can complete the test, score it, and sketch his profile within thirty minutes. Second, those who have administered the test during its standardization have found it can be an ideal guidance instrument. Testee involvement and concern have been maximal.

Administration of the Test

The test is self administering, self-scoring and self-profiling. It consists of 121 paired concepts similar to the following two:—

Dispensing drugs and prescriptions.

Inspecting and repairing motor cars.

Prescribing medical treatment for patients

Studying plant and animal life.

The testee must darken a circle opposite one choice in each couplet. Having done so, he enters the sub-totals at the bottom of each page and the grand totals at the end of the last page. He sketches his profile on a provided form using the grand totals as instructed. He may then be requested to complete an attached Self-Rating of Ability Scale. Finally, combining his two preference peaks and his own ability ratings, he examines the provided Occupational manual in the appropriate sections and finds a listing of general occupations that should warrant his further consideration.²

Inconsistency Check in the Test

Because the test employs a paired comparison technique it is possible to rank the items in ordered sequences from 6 to 0. If the sequence, 6, 4, 4, 4, 2, 1, 0, were to occur then there would be inconsistency in the choices made. If more than two of the five sheets indicated inconsistency, the validity of the test would be questioned.

Reliability of the Test

The test-retest coefficient of reliability on a sample of 104 high school students was .92. When the Kuder-Richardson (Guilford, 1956) Formula was applied to another high school sample of 236, reliability coefficients by interest areas ranged from .75 to .89.

In another check using the Kuder-Richardson Formula on a sample of 513 University freshmen the reliability coefficients by interest areas ranged from .85 to .98.

Validity of the Test

A review of the 121 couplets shows a high degree of content validity. Every item has been constructed in such a manner that it provides a measure of vocational preference in one of the seven designated interest areas.

TABLE I
COEFFICIENTS OF RELIABILITY FOR A HIGH SCHOOL
SAMPLE (A), AND A UNIVERSITY FRESHMAN SAMPLE (B)
ON THE "S" VOCATIONAL INTEREST TEST

Interest Areas	(A) r	(B) r
Economic	.85	.95
Technical	.89	.95
Outdoor	.78	.94
Service	.75	.86
Humane	.85	.98
Artistic	.89	.97
Scientific	.79	.85

N(A): 236 N(B): 513

When the test was administered to university freshmen, there was evidence of its empirical validity.³ Engineering students were high in Technical and Scientific interests and Education students were high in Humane interests. Other researchers have reported similar findings. (Strong, 1943), (Kuder, 1953), (Super, 1949).

Congruent validity was evidenced by correlating the corresponding areas of the "S" Interest Test with those of the *Kuder Preference Record*, (Kuder, 1953).

The correlation coefficients have been provided in Table II. All coefficients are positive and the range is from .20 to .70. The Technical-Mechanical and the Outdoor-Outdoor areas have the greatest positive relationship. There is no Kuder counterpart to the Service category on the "S" test.

TABLE II
CORRELATIONS BETWEEN "S" INTEREST AREAS AND
CORRESPONDING KUDER INTEREST AREAS FOR A
SAMPLE OF HIGH SCHOOL GIRLS (A), AND BOYS (B)

"S" Interest Areas	Kuder Interest Areas	(A) r	(B) r
Economic	Clerical	.53	.20
Technical	Mechanical	.70	.60
Outdoor	Outdoor	.44	.52
Humane	Social Service	.51	.32
Artistic	Artistic	.28	.33
Scientific	Scientific	.36	.33

Norms for the Test

Table III provides norms for a sample of Grade XII boys. Norms are also available for Grade XII girls; and for university freshmen, dichotomized for men and women and divided into Arts and Science, Engineering, and Education categories.

TABLE III
PERCENTILE NORMS BY AREA OF VOCATIONAL INTEREST
FOR GRADE 12 BOYS ON THE "S" TEST

PERCENTILES BY INTEREST AREA							
Raw Score	Economic	Technical	Outdoor	Service	Humane	Artistic	Scientific
30							
29							
28		90					
27							
26		80					
25		70	90				90
24			80				
23	90	60					80
22		50	70				70
21			60	90			60
20	80		50		90		50
19		40					
18			40	80		90	
17				70			40
16	70	30	30	60	80		30
15	60			50			
14			20		70		
13		20	10	40			20
12	50			30	60	80	
11	40						10
10				20	50		
9	30	10		10		70	
8					40	60	
7	20				30	50	
6							
5	10				20	40	
4						30	
3					10	20	
2							
1						10	
0							

N=136

PART II

Administration of "S" Interest Test to U.A.C. Freshmen

The sample for this study was 513 first year University of Alberta, Calgary, students. The students were registered in the Education, Engineering, and Arts and Science faculties. In the sample there were 144 Bachelor of Education students, consisting of 93 females and 51 males; 124 Junior Elementary Education students, consisting of 92 females and 32 males; 62 arts and Science students, consisting of 39 females and 23 males; and 83 male Engineering students. The sample represented 94% of the Bachelor of Education freshmen; 99% of Junior Elementary students; 70% of the Arts and Science freshmen, and 83% of the Engineering students. Collectively, the sub-groups represented 84% of the total 1961-62 class freshmen.

Testing and Procedure Followed

Two Faculty of Education psychologists administered the tests during a two week period in October.⁴ The tests were administered in regularly scheduled classes of required freshman courses. Student co-operation was requested by providing a verbal explanation of their role in the standardization procedures. Furthermore, their co-operation was sought by assuring them of anonymity of response and by informing them that they could have their interest profiles privately interpreted by one of the psychologists. The attentiveness of each student while completing his inventory supported the assumption that proper rapport between tester and testee had been established. There were only 18 non-usable inventories returned. Only one instance of "faking good" was suspected.

Processing the Data

Although the inventory was self-scoring and self-checking and although the students had to complete the arithmetic calculations before graphing their interest profiles, the researchers had all the scoring and calculations re-checked. When the researchers were convinced that the inventory was usable, the raw scores from interest category were transferred to student class lists. The data were then prepared for processing by the LGP 30.

The data were punched on Friden Flexowriter tape. In accordance with the instructions of the Adam's program, "Intercorrelation of Three-Digit Variables", the program consisted of two routines. The first generated "the normal matrix" of a set of m observations of n variables. The second part calculated from this matrix for each pair of variables, the regression of coefficients, the correlation coefficients, arithmetic means and standard deviations.

Tables were prepared from the output forms of five tapes run on the LGP 30 by Mr. W. S. Adams, University of Alberta, Edmonton, Computing Centre.⁵ The tables show intercorrelation matrices, standard deviations, and means for freshmen, Bachelor of Education, Junior Elementary Education, Arts and Science, Engineering, and total freshmen groups respectively. Data for the latter group appear in Table IV.

TABLE IV
INTERCORRELATION MATRIX, STANDARD DEVIATIONS,
AND MEANS FOR ALL* U.A.C. FRESHMEN AS MEASURED
BY THE SAFRAN VOCATIONAL INTEREST INVENTORY

Interest Areas	INTEREST AREAS						
	E	T	O	Ser.	H	A	Sc.
Economic	1.00	-.26	-.49	.21	-.11	-.08	-.08
Technical		1.00	.13	-.03	-.36	-.36	.10
Outdoor			1.00	-.26	-.01	-.13	-.04
Service				1.00	-.17	-.20	-.26
Humane					1.00	.02	.00
Artistic						1.00	-.31
Scientific							1.00
Sigmas	6.62	7.40	5.28	5.02	6.30	6.85	4.73
Means	15.22	9.67	17.38	14.29	17.71	15.60	14.96

*N = 513 (1960-61 Class) (Male = 289; Female = 224)

Note: r's exceeding .09 (either positive or negative) are significant at the .05 level.

The senior author calculated the statistics of differences of means and standard deviations between each group of freshmen and each other group. Estimates of standard deviations were calculated and one-tailed tests of significance were made. Significant probability values ranging from .05 to .005 were found and indicated by appropriate subscripts. A sample is shown in Table V.

General Findings

Detailed examinations of the intercorrelation matrices resulted in the following findings:—

1. There were negligible, slightly positive or fairly substantial, negative intercorrelation between the interest areas. In general these findings supported logical expectations. It was concluded, therefore, that the inventory was measuring a number of mutually exclusive areas of vocational interests. Three examples of statistical evidence to support logical expectations follow:—
 - (a) It was expected there would be a positive correlation between Scientific and Technical interest areas. An examina-

TABLE V
ANALYSIS OF DIFFERENCE OF MEANS AND STANDARD DEVIATIONS BETWEEN U.A.C.
FRESHMEN ENGINEERS, ARTS AND SCIENCE, AND EDUCATION STUDENTS IN INTEREST
AS MEASURED BY THE SAFRAN VOCATIONAL INTEREST INVENTORY

Classification of Freshmen	Arts and Science				Bachelor of Education				Junior Elementary			
	Diffn of Means	t	Diffn of Sigmas	t	Diffn of Means	t	Diffn of Sigmas	t	Diffn of Means	t	Diffn of Sigmas	t
Economic	3.80	4.15 _a	2.50	3.25 _a	3.57	4.75 _a	1.86	3.48 _a	4.50	6.23 _a	1.14	2.22 _a
Technical	9.63	9.00 _a	2.55	2.85 _a	13.38	16.34 _a	2.40	4.13 _a	15.14	19.44 _a	1.53	2.77 _a
Outdoor	.88	.89	.79	.94	1.30	1.81 _a	.81	1.59	1.90	2.82 _a	.57	1.19
Service	1.50	1.60	.93	1.18	.33	.54	.42	.97	.81	1.34	.53	1.24
Humane	4.68	4.74 _a	2.44	2.93 _a	9.04	15.67 _a	.08	.19	9.77	16.12	.08	.19
Artistic	5.48	4.95 _a	1.85	1.98 _c	7.01	8.07 _a	1.42	2.29 _c	7.92	8.79 _a	1.48	2.31 _c
Scientific	3.33	3.77 _a	1.13	1.52	5.46	9.89 _a	.86	2.19 _c	5.73	10.55 _a	.59	1.52 _c

Note: Significant Probability values of .005, .01, .025, and .05 designated by subscripts a, b, c, and d respectively.

tion of the matrices showed slight positive correlation in 4 out of 5 groups tested. The actual correlations were .20; .08; .27; —.09; and .10.

- (b) It was expected there would be a negative correlation between Technical and Humane interest areas. An examination of the matrices showed significant negative correlations of —.52, —.37, —.52, —.33, —.36 respectively.
 - (c) It was expected there would be a negligible correlation between Humane and Artistic interest areas. An examination of the matrices showed correlations of —.06, —.11, .04, —.03, and .02 respectively.
2. A number of significant interest area correlations, each significant at or beyond the .05 level were found. They were as follows: —
- (a) Economic interests were negatively correlated with Technical and Outdoor interests.
 - (b) Technical interests, with a few sub-group exceptions, were positively correlated with Outdoor and Scientific interests.
 - (c) Outdoor interests, with a few sub-group exceptions, were negatively correlated with Service, Humane, and Artistic interests.
 - (e) Humane interests, with a few sub-group exceptions, were negatively correlated with Technical and Outdoor interests.
 - (f) Artistic interests tended to be negatively correlated with interests in each of the other six areas. 26 out of a possible 30 inter-correlated were negative and of these 18 were significant at or beyond the .05 level.
 - (g) Scientific interests were negatively correlated with other sub-groups interest patterns in 20 out of 30 instances. 13 of the 20 negative correlations were significant at or beyond the .05 level. There were, however, four significant positive correlations between Scientific interests and Technical and Humane interests.

Detailed analyses of the differences of means and of standard deviations for each category of freshmen compared to each other category were computed. The analyses resulted in the following significant findings: —

1. Bachelor of Education freshmen had mean scores in Technical, Service, Humane and Scientific interest areas that differed significantly from the mean scores of at least one of the other three categories of freshmen.
2. Bachelor of Education freshmen had sigmas in Economics, Tech-

nical, Outdoor, and Humane interest areas that differed significantly from the sigmas of at least one of the other three categories.

3. Bachelor of Education freshmen were *not* significantly different in means or sigmas from any other category of freshmen in Artistic interests.
4. Engineering freshmen had means and sigmas which differed significantly from the means and sigmas of virtually every other freshmen group in all seven interest areas. Outdoor and Service interests were the two areas where a number of non-significant differences were discovered.
5. Arts and Science freshmen had mean scores that differed significantly from the mean scores of Total Freshmen in Technical, Service, Humane, Artistic, and Scientific interest areas.
6. Arts and Science freshmen were *not* significantly different in sigmas from Total Freshmen in a single interest area.

Summary

This article has introduced the Safran Vocational Interest Test and given a detailed discussion of its administration to a university freshmen sample.

Supporting statistics have been provided for the contention that the test has sufficient validity and reliability to warrant its experimental administration in other situations. Tables of Norms for high school and university freshmen samples have been prepared. A Manual of Vocations has also been designed to accompany the test.

It has been discovered that the test significantly differentiates between Engineering, Education, and Arts and Science freshmen in most of the seven interest areas. Finally, the test has proven to be an ideal guidance instrument at both the high school and the college levels. It appears logical, therefore, to conclude that any educator involved in counselling young adults who are attempting to make vocational choices should find the Safran Vocational Interest Test useful.

REFERENCES

1. Adams, W. S. *Intercorrelation of Three-Digit Variables—Programme for LGP. 30*. Edmonton, Alberta: University of Alberta Computing Centre, June, 1960. (mimeographed).
2. *Guidance Newsletter*, Department of Education, Edmonton, Alberta, 1960, (mimeographed).
3. Guilford, J. P. *Fundamental Statistics in Psychology and Education*, New York: McGraw-Hill Book Company, Inc., 1956.
4. *Kuder Preference Record Vocational Manual*, Chicago Science Research Associates, 1953.

5. *Minnesota Occupational Rating Scales*, Chicago, Science Research Associates, 1941.
6. Strong, Edward K. *Vocational Interests of Men and Women*, London, Oxford University Press, 1943.
7. Super, Donald E. *Appraising Vocational Fitness*, New York, Harper, 1949.

FOOTNOTES

1. The data referred to were circulated by the Alberta Department of Education, and have been cited in reference (2).
2. Any reader wishing to secure a free specimen copy of the test and the Occupational Manual, is invited to do so by sending his request to either of the authors. The manual is similar to the one used with the M.O.R.S. (See reference 5).
3. Figure 1 has been prepared to give graphic support to the argument that the test has empirical validity.
4. The authors are pleased to acknowledge the co-operative support of Professor J. G. Snider, who assisted the senior author in administering the tests to the University of Alberta, Calgary, freshmen.
5. The authors are pleased to acknowledge the valuable assistance of Mr. W. S. Adams, who generously gave of his personal time to process data on the LGP. 30 in Edmonton.

ALBERTA SCHOOL BOARD POLICY HANDBOOKS

A. R. MYHRE AND H. T. SPARBY

I. The Problem

The need for some form of guidance in the formulation and revision of school board policy handbooks has often been expressed. Professional administrators have noted the need. Mort states:

One very pressing need for almost all school systems (state or local) is the creation, or overhauling in a systematic fashion, of their school codes or statements of policies.¹

The purpose of this study was to develop a list of guiding principles and proven practices that would be of value to a school board which was involved in writing or revising a policy handbook. It was assumed that such a list could be developed through an examination of present handbooks and through a survey of actual board practices involved in their writing and revision.

During the course of the study answers were sought to the following questions:

1. What type of handbook is used by rural school boards? This question attempts to focus attention on the following points:
 - (a) Physical appearance of Alberta school board policy handbooks.
 - (b) The major subject divisions, and the specific nature of policy handbook contents.
2. What procedures are followed in the organization and revision of a policy handbook? In an attempt to determine strengths of method which could be recommended to others, answers were sought to the following questions:
 - (a) What practices and principles are involved in writing policy handbooks?
 - (b) How are handbooks revised and kept up to date?
 - (c) What legal considerations are involved?
3. What reasons are given by school administrators for having a policy handbook? This question involved an evaluation of the contributions that a policy handbook has made to an administrative unit and its personnel.

II. Collection and Treatment of Data

Data were received from the following sources:

1. Related literature.
2. Twenty Alberta policy handbooks.
3. Professional school administrators.
4. School board members and secretary-treasurers.

All available handbooks from Alberta rural school boards and county committees were collected and analyzed. A questionnaire was prepared and used for two purposes:

¹Paul R. Mort, and Donald H. Ross, *Principles of School Administration* (New York: McGraw-Hill Book Company, Inc., 1957), p. 378.

- (a) to structure interviews with board members, secretary-treasurers, and superintendents, and,
- (b) to collect data by mail.

Since every school board was contacted, the findings of this study are based on a complete set of data from all the participating units.

III. Summary of Findings

Contents of Policy Handbooks

The twenty existing Alberta school board policy handbooks contain policies, regulations, and information on a great many subjects in the field of school administration. Subject areas included are: (a) historical background and an up-to-date description of the administrative unit, (b) duties and powers of school board members and employees of the board, (c) policies and regulations relating to pupils, (d) policies and regulations governing the "externa" of education, and (e) references to government acts and regulations.

Writing and Revising Handbooks

Although methods vary from place to place, there is a pattern of practices which should prove helpful to boards of trustees who are planning to write or to revise their handbooks.

It is generally agreed that policies are likely to be most effective if they represent the cooperative efforts of the persons affected by them. Most of the handbooks studied in this investigation were the results of committees who, directly or indirectly, involved school board members and their officers, school employees, and the public.

Two legal considerations stand out in the formulation of codified policy. First, all policies and regulations of a school board must be in accord with provincial statutes, departmental regulations, and common law. In the second place, the contents of a policy handbook, to be legally effective, must be officially adopted by a motion of the school board.

The Reported Value of Codified Policy

Reports of the experiences of the twenty Alberta rural school boards who have handbooks suggest that a policy handbook can make many valuable contributions to a school system. Considerable agreement between Alberta's school administrators and American writers on the worth of codified policy is evident. The many values associated with a policy handbook appear to outweigh the few reported disadvantages. The findings suggest that school boards, their administrative personnel, and employees all benefit from a clear written statement of school policies and regulations.

IV. Conclusions and Recommendations

Two main conclusions arise from this study of Alberta school board policy handbooks:

1. The reported success of the twenty existing school board policy handbooks in Alberta suggests that every school system would benefit by having its policy in writing.
2. There is a special need for guidance in the writing and revision of school board policy handbooks.

The recommendations which follow are designed to act as a check list for school boards that are planning to write a handbook for the first time and for those boards that are revising a handbook which they already possess. Most of these recommendations are based on proven practices and guiding principles which are presently being followed somewhere in the province.

Recommendations Relating to the Contents of a School Board Policy Handbook

The school board policy handbook, as an instrument of local educational philosophy, should be designed to meet the special needs and expectations of the community. Since communities are unlike one another, (e.g. physically, economically, and culturally), school policies and regulations, in responding to a variety of conditions, will probably be different in detail. For this reason, policies and regulations should be developed locally. Handbook statements from other administrative units may not be entirely effective or acceptable if they are adopted in a new setting.

The following list suggests various sections of information and policy which handbooks may include.²

1. *Preface:*

- (a) The preface should include a statement of the educational philosophy and the objectives of the local school system.
- (b) Written into the preface should be the plan for revising and keeping the handbook up to date.
- (c) An acknowledgement of those who helped to write the handbook may also be included.

2. *Descriptive Features of the Administrative Unit:*

- (a) A short historical account of the administrative unit may be included for background.
- (b) A description of the present administrative unit and its operation should be given for the orientation of new board members and school employees.
- (c) A listing of administrative personnel, including their phone numbers and address has been found useful.
- (d) Educational associations that are active in the community may also be described very briefly.

²A suggested table of contents for a policy handbook appears in Appendix A of this study.

3. *Duties and Powers of Administrative Officers:*
The duties and powers of the following administrative officers should be clearly defined in writing:
 - (a) School board members.
 - (b) Superintendent of schools.
 - (c) Secretary-treasurer.
 - (d) Supervisors of instruction.
 - (e) School principals and assistants.
4. *Administrative Policies Affecting Teachers:*
Statement of policy and information governing a teacher's conditions of employment and responsibilities should be recorded.
5. *Administrative Policies and Regulations Relating to Pupils:*
 - (a) A policy handbook should state board policies and regulations which may assist principals and teachers in the management of student-school affairs, (e.g. policy on attendance).
 - (b) Information of interest to pupils, such as lists of scholarships and awards, may also be included.
6. *Administrative Policies and Regulations Relating to Non-Professional Employees:*
The duties and lines of responsibility of the following school employees should be clearly outlined:
 - (a) Bus drivers.
 - (b) Clerical assistants.
 - (c) Custodians.
 - (d) Maintenance foremen.
7. *Administrative Policies and Regulations Relating to School Buildings and Equipment:*
 - (a) Regulations controlling the rental and care of school buildings and equipment by outside groups should be recorded in the policy handbook.
 - (b) School board grants for school equipment and student activities should be stipulated.

The policy handbook must be comprehensive in coverage in order to act as a complete guide on the administrative affairs of the school system. In addition to what is suggested above, a handbook might contain pertinent quotations and/or references to provincial laws. Preferably, these should be compiled together into one section of the handbook. Paraphrasing provincial laws and regulations and removing sections out of context are questionable practices. Where lengthy sections of provincial statutes are pertinent, reference to them is preferable to long quotations.

Recommendations Relating to the Formulation and Revision of a Policy Handbook

This section of the study attempts to bring together some guiding principles and practices that have proven successful in writing and revising policy handbooks. Outlined below is a suggested course of action which a school board might follow in writing a handbook:

1. A steering committee of about five persons should be appointed to pilot the policy handbook through its formulative stages. This committee could include a school board member, the superintendent, the secretary-treasurer, a principal, and a teacher.
2. A tentative table of contents and a system for enumerating items should be drawn up by the steering committee. These should be reviewed by the principals' association and then referred to the school board for approval.
3. Committees of principals should be set up to develop certain sections of the handbook. Some attempt should be made to involve other employees who are directly affected by the policies.
 - (a) A review of school board minutes has proven helpful in locating policies which are still in effect.
 - (b) The style of writing used in a handbook should be clear and understandable to everyone who will be reading it.
 - (c) An attempt should be made to avoid the inclusion of temporary notices and pedagogical materials that are better handled by a superintendent's bulletin or by an instructional handbook.
4. The steering committee should review each section as it is completed in first draft, and forward it to the school board for approval. Any changes that are necessary should be returned to the committee that did the original writing.
5. After all sections receive school board approval, the handbook should be proofread by some competent person who is familiar with board policy. The superintendent should review the statements of policy in terms of their legality. Any questionable items should be sent to the Department of Education for a ruling.
6. The handbook should be printed on an office duplicating machine, bound in looseleaf type binders, and submitted to the school board for its official adoption:
 - (a) The committee should plan for a system of paginating the handbook which allows for the addition and deletion of pages. Lettering each section alphabetically and starting at page one in each section has proven a satisfactory system.
 - (b) To provide greater ease in revising the handbook, some consideration should be given to placing on each page only one area of policy.
 - (c) Subject headings should be recorded in large print at the top or bottom of each page.
 - (d) A tab system or a thumb-indexing system should be considered to help a reader find a particular section in the handbook. Printing each section of policy on a different color of paper is also a helpful practice.
 - (e) The handbook should be bound with a durable cover that will withstand continued handling.
7. The policy handbooks should be widely distributed and made available to all interested persons in the community. Every school employee should have a copy. A school board might consider giving copies to community libraries and to local Home and School Associations.

The dynamic nature of educational objectives suggests that school board policy handbooks must be reviewed and revised in systematic fashion in order to keep policies and regulations up to date and in harmony with changing conditions. The following recommendations are intended: (a) to assist boards in reviewing

and revising statements of policy, (b) to help keep distributed copies of the handbook up to date, and (c) to enable school employees to be more conversant with policy changes:

1. The school board should record the adoption of a definite plan for periodic revision of its handbook. An annual revision early in the school year is suggested.
2. The board should plan an annual review of the handbook to consider the elimination or correction of outdated policies and regulations.
3. Additions and amendments to policies and regulations should be adopted by a motion of the board.
4. All interested persons and groups should keep the handbook under review and participate in the revision of policies, rules, and regulations by recommending changes to the school board.
5. A school board should keep a master copy of its policy handbook in which changes and additions can be recorded as they occur. This master copy can then be used as a guide for an annual revision of distributed copies.
6. In order to keep distributed handbooks up to date, the revised pages should be sent out to principals with instructions for the addition and deletion of specified pages. An alternative plan would be to have the handbooks delivered to the central office where the necessary changes could be made.
7. Some plan should be considered which will encourage school employees to study the policy handbook and to acquaint themselves with policy changes. A review of the handbook at an annual teachers' institute, or at school staff meetings, early in the school year is suggested.

A STUDY OF CERTAIN FACTORS RELATED TO ACHIEVEMENT IN SPELLING

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Statement of the Problem

For years the ability to spell accurately has been deemed one criterion of a well-educated person. In addition, accuracy in this tool subject has often been used as a measure of the success of the teaching methods employed in our schools. Success in teaching spelling has frequently been questioned. In spite of much research throughout the last half century the component factors in learning to spell have not been adequately assessed.

This study of factors thought relevant to achievement in spelling was undertaken for the purpose of securing for one level of learning some knowledge of the comparative importance of certain abilities and skills. To accomplish this purpose, answers to the following specific questions were sought:

1. What is the relationship between each factor found to be a component of spelling ability and spelling achievement at a given level of learning as measured in one population sample?
2. What are the contributions of the most significant of these factors to variance in spelling achievement?

Knowledge of the factors that affect achievement in spelling should provide a basis for the selection of the abilities and skills to be emphasized at that grade level in the teaching of spelling.

Design of the Study

The survey-testing method of research was employed to gather the data required to provide answers to the specific questions stated. A thorough survey* of existing research and literature was made to ascertain the various factors which had been found to determine achievement in spelling. Only intelligence and those abilities and skills found positively related to spelling ability, and amenable to instruction, were selected for study. (The term, factor, as used in the study refers to intelligence and the abilities and skills above mentioned.) Following is the list of the factors so ascertained and shown to be significant.

1. Verbal intelligence
2. Nonverbal intelligence

*A survey of the Abilities and Skills Affecting Achievement in Spelling appeared in the September issue of this Journal.

3. Visual discrimination of words
4. Visual memory
5. Auditory discrimination of words
6. Auditory memory
7. Phonetic analysis
8. Structural analysis
9. Word derivation
10. Auditory discrimination of syllables
11. Ability to spell phonetic syllables
12. Reading vocabulary
13. Reading comprehension
14. Word recognition ability
15. Knowledge of word meanings
16. Accurate pronunciation

The next step was to select tests to measure verbal and nonverbal intelligence, achievement in each specific ability, and achievement in spelling. The following standardized tests proved useful:

Lorge-Thorndike Intelligence Tests, Verbal Battery, Level 3, Form A, Lorge & Thorndike, 1954.

Lorge-Thorndike Intelligence Tests, Nonverbal Battery, Level 3, Form A, Lorge & Thorndike, 1954.

SRA Reading Analysis Test: Aptitude, Form A, (Standardization edition), Jay & Huelsman, 1954.

The Developmental Reading Tests: Silent Reading Diagnostic Tests, Form D-A, Bond, Clymber & Hoyt, 1955.

California Reading Test, Elementary, Form W, Tiegs and Clark, 1957.

Lincoln Diagnostic Spelling Test, A. L. Lincoln, 1956.

Because standardized tests did not seem to be available to measure the remaining factors the following tests were specifically constructed for the purpose:

Auditory Discrimination of Syllables

Ability to Spell Phonetic Syllables

Word Derivation

Accurate Pronunciation of Words.

This battery of selected tests and subtests was administered to sixth grade children in Calgary, Alberta. Because sixth grade children should have developed, to a noticeable degree, many of the abilities and skills required for competency in spelling, this level

of learning was considered appropriate. Moreover, if some of these children were poor spellers, there should be a variance in certain of the factors that contributed to achievement. A total of nineteen tests and subtests was administered to 498 children in grade six. Four hundred complete sets of data were obtained and statistically analyzed.

To determine the relationships between spelling achievement and the factors related to its success, the zero order coefficients of correlation and the intercorrelations were calculated by IBM machine. This information provided the answer to the first question: What is the relationship between each factor tested and spelling achievement?

To determine the contributions of the most significant of these factors to variance in achievement, it was necessary (1) to determine the contribution of the combined sixteen factors, (2) to select from these factors a combination which would predict achievement with maximum efficiency, and (3) to calculate the amount contributed to variance in achievement by each of the selected tests. The coefficient of multiple correlation, R , indicated how accurately a given combination of variables predicted the criterion, or the extent to which achievement could be accounted for by the sixteen factors evaluated, or any given group of these factors.

To compute multiple R , the Wherry-Doolittle test selection method was used. This procedure (1) selected those tests which yielded a maximum multiple correlation, R , with the criterion test, (2) calculated the multiple R after the addition of each test, stopping when the addition of a new test contributed nothing more, and (3) computed a multiple regression equation from which the criterion could be best predicted (1:404). The calculations for the Wherry-Doolittle test selection method were done in the Computer Center at the University of Missouri. The results obtained, multiple R^2 's, were expressed in terms of beta coefficients. The substitutions in the formula for R^2 (1:396) yielded the contribution to variance that this team of tests made to achievement. In addition, each of the separate terms of the equation gave the contribution to variance which each test made to the criterion. The amount contributed to variance in achievement by the joint action of the sixteen factors as well as the amount contributed by each of these factors were determined in this way. Similarly, the amount contributed by the combination of selected factors and each of the factors which predicted achievement with maximum efficiency was computed. This information answered the second question stated: What are the contributions of the most significant of these factors to variance in spelling achievement?

Summary of Significant Findings

The analyses of these data revealed certain significant findings for the sixth grade level of learning in relation to each of the questions presented in this study.

The first question for study was stated as follows: What is the relationship between each factor found to be a component of spelling ability and spelling achievement at a given level of learning in one population sample?

The significant findings with respect to degrees of relationship obtained may be summarized as follows:

1. The coefficient of correlation obtained between achievement in spelling and verbal intelligence was .68, the highest correlation between spelling achievement and any of the selected factors studied; for nonverbal intelligence it was .39.

2. The coefficients of correlation obtained between achievement in spelling and each of the selected reading and word analysis abilities studied ranged from .51 to .63. All the correlations in this group were substantial. Specifically, these relationships were as follows:

Spelling phonetic syllables	.60
Phonetic analysis	.63
Reading comprehension	.63
Reading vocabulary	.61
Word derivation	.60
Word recognition	.55
Accurate pronunciation	.51

3. The coefficients of correlation obtained between spelling achievement and the visual abilities studied were lower than those between spelling achievement and the reading and word analysis abilities as a group. Although one correlation was considered low, the others were substantial. They ranged from .38 to .44. Specifically, these relationships were as follows:

Visual memory	.44
Visual discrimination	.40
Structural analysis	.38

4. The coefficients of correlation obtained between spelling achievement and the selected auditory abilities were lowest of all, ranging from .24 to .36. Although these correlations were considered low, they were not low enough to be considered negligible. Specifically, these relationships were as follows:

Auditory discrimination of syllables	.36
Auditory memory	.35
Auditory discrimination	.24

5. Substantial correlation coefficients were obtained among the several language arts abilities studied. Representative examples of these relationships follow:

Word derivation and reading comprehension	.68
Spelling achievement and phonetic analysis	.63
Reading vocabulary and word recognition	.58
Spelling achievement and word recognition	.55
Spelling achievement and accurate pronunciation ...	.51
Word meanings and word derivation	.50
Phonetic analysis and word recognition	.49
Reading comprehension and word meanings	.46
Spelling achievement and word meanings	.40

The second question posed for study was stated as follows: What are the contributions of the most significant of these factors to variance in spelling achievement?

The significant findings with respect to the amounts in per cent contributed to variance in spelling achievement may be summarized as follows:

1. The contribution to variance in spelling achievement by the total group of factors was 71.62 per cent, or 72 per cent.

2. The remaining 28.38 per cent, or 28 per cent, of the variance in spelling achievement must be attributed to factors not measured in this study.

3. Eight of the sixteen factors were found to predict achievement with maximum efficiency. This amount was 70.51 per cent while that contributed by the total group of factors was 71.62 per cent. This group of eight factors found to contribute with maximum efficiency with the amount contributed by each were as follows:

Verbal intelligence	16.77
Spelling phonetic syllables	14.21
Accurate pronunciation	7.29
Word recognition	7.20
Phonetic analysis	7.17
Reading comprehension	6.96
Visual memory	6.54
Visual discrimination	4.37

4. Of the 70.51 per cent contributed to variance in spelling achievement by this group of selected factors, 16.77 per cent was attributed to verbal intelligence and the remaining 53.74 per cent to the group of abilities and skills studied.

5. The amount contributed to variance in spelling achievement by the ability to spell phonetic syllables was 14.21 per cent; this amount was approximately twice that contributed by any one of the other abilities and skills.

6. The amounts contributed to variance in spelling achievement by each of the remaining abilities and skills were approximately equal.

7. After eight of the sixteen factors has been selected to form the battery of tests for predicting spelling achievement with maximum efficiency, the addition of any one of the remaining factors produced a combination of tests which predicted spelling efficiency with practically the same efficiency. The amounts contributed to variance in spelling achievement by these different combination of eight selected factors ranged from 69.83 to 70.51 per cent.

8. Although the zero order relationships indicated that certain abilities and skills were substantially related to achievement in spelling, the amount in per cent that each contributed to variance in achievement differed greatly.

Conclusions

Within the limitations of this study, the following conclusions appear to be valid for the sixth grade level of learning:

1. The greatest single contributor to variance in spelling achievement is verbal intelligence.

2. The group of selected abilities and skills as measured in this study account for a substantial portion of the variance in spelling achievement.

3. Of the abilities and skills investigated in this problem, the ability to spell phonetic syllables is the greatest contributor.

4. A relatively large amount of the variance in spelling achievement is attributed to factors not measured in this study. Some examples of such factors are interest, motivation, and certain other abilities and skills not measured.

5. The extent to which a particular factor accounts for performance in spelling does not necessarily depend upon the relationship exhibited between that factor and achievement in spelling.

6. Spelling is a complex process involving the application of several skills and abilities.

7. A constellation of abilities appears to be related to achievement in certain of the language arts areas at the sixth grade level of learning. Spelling ability, apparently, is one of this group.

Educational Implications

Since tests have provided much of the data for this study, the educational implications which follow are based on the abilities and skills which have been evaluated by these tests. In the light of the conclusions reached, the following implications for education appear to be justified for the sixth grade level of learning:

1. In the teaching of spelling, the ability to apply phonetic knowledge to the writing of words should receive a great amount

of emphasis. The teacher should direct attention to the words that are spelled as the sounds of the letters indicate. In addition, attention should be directed to the parts of the words in which there are inconsistencies between the sounds of the phonetic elements and the symbols used to represent them.

2. During the teaching of spelling words, attention should be given to accurate pronunciation. Words such as elm, chimney, surprise, pumpkin, quiet, and height, which are habitually mispronounced, or carelessly spoken, should be clearly and correctly pronounced.

3. When teaching spelling words, the teacher should be certain that the children are able to recognize the words they are to learn. The proper serial order of the letters should be emphasized to clear up confusions resulting from reversible word forms similar in configuration.

4. The sixth grade teacher should give specific attention to the child's growth in knowledge of phonetic analysis, or the ability to associate the appropriate sounds of the letters with their printed forms. This knowledge should include ability to recognize rhyming words, the sounds of the consonants in the initial, medial, and final positions in words, and the sounds of the vowels.

5. The teacher should give a certain amount of attention to the development of visual memory, or the ability to remember the forms of words. Special practice in writing words after a short exposure period would be useful in developing visual memory for those who are weak in this ability.

6. The teacher should also give a certain amount of attention to the development of visual discrimination ability, or the ability to detect small differences in the forms of words. Specific practice in identifying words which are similar in general form but different in meaning should be provided to develop this skill.

7. Spelling ability is a part of the constellation of skills forming the language arts. A teacher can make a marked contribution to the development of spelling ability by promoting general linguistic ability, particularly in the area of reading. The converse of this generalization would also appear to be true.

REREFENCE

- (1) Garrett, Henry E. *Statistics in Psychology and Education*. New York: Longmans, Green and Company, 1953.

AN ANALYSIS OF LANGUAGE THEMES IN GRADE FIVE, GRADE EIGHT, AND GRADE ELEVEN

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The Problem

The purpose of this investigation is to describe what the students in grade five, in grade eight, and in grade eleven may be expected to produce in their free writing. It is hoped, by comparing the work of pupils at these grade levels, it will be possible to gain some insight into the increase in skill in writing. Specifically, does the pupil in grade five write complex sentences, or is he consistently using only simple sentences? Do the pupils in these grades use such techniques as the participial phrase and the appositive to subordinate ideas of lesser importance? Does the student's writing show increased skill in varying sentences from grade to grade? It is hoped in this way to trace the linguistic development of the student and to indicate the implications for language teachers.

Specifically the purposes of the study were three:

1. To determine what can be expected of students in grades five, eight, and eleven in written themes.
2. To chart the linguistic development of the child as he progresses from one grade to another.
3. To note the implications of the study for the teachers of language.

Procedure

To collect data for the study, themes written on the open topic, "An Unusual Adventure or Experience," were collected from grade five, grade eight, and grade eleven students in the County of Grande Prairie City. All possible precautions were taken to ensure that the themes were written under the same conditions and at the same time. Three teachers from the participating schools scored each theme in the grade in which she taught, then recorded her mark on a separate sheet. Instructions were to grade the papers roughly for appearance and mechanics, then to give particular attention to expression and content. The final sample was chosen by limiting it to those themes upon which three teachers agreed on the rating. This resulted in 119 papers being chosen for analysis, viz., 40 for Grade five, 35 for Grade eight, and 44 for Grade eleven.

The analysis covered eighteen items: sentence structure (simple, compound, complex, compound-complex); loose, periodic, balanced

sentences; clauses (adverbial, noun, adjectival); sentence fragments, and run-on sentences; stylistic devices (words in series, parallelism, parenthetical construction, participial phrases, appositive). The analysis was made by counting the number of each of these constructions in each theme and tabulating the data.

Analysis

The themes of the grade five children yielded the following information about the constructions used:

1. Forty-five per cent of the sentences are simple.
2. All sentences are loose sentences.
3. Seventy per cent of the subordinate clauses are adverbial.
4. There are only a few participial phrases.
5. There are approximately thirty-seven subordinate clauses in every one hundred sentences.
6. A high proportion of the compound sentences are run-on.
7. There are approximately three sentence fragments for every one hundred sentences.

The grade eight themes indicated:

1. There are more complex sentences written than other types according to structure.
2. Forty-seven per cent of the sentences are written with subordinate clauses.
3. Most sentences are loose sentences.
4. The participial phrase is written more frequently than any other stylistic device.
5. Sixty clauses are written in one hundred sentences; thirty-six of these are adverbial, fifteen are noun, and nine adjectival.
6. There are few sentence fragments.
7. Fifty-five per cent of compound sentences contain the run-on error.

The themes from the grade eleven group indicated:

1. That grade eleven students are writing more simple and fewer compound sentences than the grade eight pupils.
2. The compound sentence is being constructed in a more concise manner; hence, the run-on error is decreasing.
3. The loose sentence is being used almost exclusively, but there is an increased use of the selective stylistic device.
4. About half the clauses in the complex and compound-complex sentences are adverbial, but the number of relative clauses

- is increasing. Not only is the noun clause being used as object and complement as in grade eight, but also as the subject of the sentence.
- 5. An outstanding growth in the use of stylistic devices analysed. Even though the participial phrase still has the highest frequency of use, the other devices are liberally sprinkled throughout the composition. Approximately one of these devices is used in every second sentence.
 - 6. Sentence fragments are infrequent and are usually due to careless omission of words.

Comparison of the Data by Grades

Comparison of Sentences by Structure

One of the purposes of the study was to compare the development of the child as he progressed from grade five, to grade eight, and then to grade eleven. In order to observe the growth in sentence structure, the percentage of each type of sentence is listed in the table below.

TABLE I
PERCENTAGE OF SENTENCES ACCORDING TO STRUCTURE
IN GRADES FIVE, EIGHT, AND ELEVEN

Grade	Simple	Compound	Complex	Compound-Complex
Five	44.9	25.1	20.9	9.1
Eight	29.6	23.4	32.8	14.1
Eleven	36.6	20.7	27.7	15.0

The writing of simple sentences decreased by almost fifteen per cent from grades five to eight, then increased from grade eight to eleven by seven per cent. Conversely, the complex sentence showed a marked increase of twelve per cent from grades five to eight, and then decreased by almost five per cent from grades eight to eleven. The compound sentence decreased by a small percentage through the grades. The compound-complex sentence increased from grades five to eight by five per cent, then decreased by a very small percentage (0.9 per cent) in the grade eleven themes. These results are contradictory to both the Stromzand study, (1924) and Frogner investigation (1939).

What accounts for the inconsistencies in our results? Do the pupils in grade eight consider that the simple sentence is an ineffective sentence and something to be avoided? Is the emphasis on

the teaching of complex sentences in the junior high school responsible? Then, in grade eleven, having crossed the hurdle of the grade nine examination, has the pupil reverted to the simpler style of writing? Or does the grade eleven student realize that the simple sentence is a good sentence and, in trying to clarify his writing, is he again using it?

Referring again to the simple and compound sentence, it appears that there may be a relationship between the writing of the simple and compound sentences in grades eight and eleven. As the frequency of the simple sentence increased, that of the compound sentence decreased. This may be because the grade eleven student is writing more concisely, simplifying his writing by using modifiers and phrases instead of using the subordinate clause. The grade five pupils write simple sentences in this way:

One day my two brothers and I were going to ride a pig.

One day I thot of training a calf.

The grade eight pupils write the compound sentence in this manner:

The Vanguard had run aground and she had broken the rudder and two of the engines.

They hurried back to the rest of the men and Jim told them about it.

The following are examples of simple sentences as written by grade eleven students:

The hard-working pioneers of yesterday did much for the people of today.

A mournful wind sprang up, flapping at the tents and howling in the pines.

When one considers the simple sentence written by the grade eleven students, it is reasonable to suppose that the two examples from the grade eight themes could have been written as simple instead of compound.

Comparison of the Use of Subordinate Clauses

Throughout the study, the adverbial clause showed the highest frequency, followed by the noun and then by the adjectival. As the pupils have more practice in writing, and gain wider experience, the amount of subordination not only increases, but also a more varied type is used. The increase in the use of the noun clause from grades five to eight is almost seven per cent, and the increase from eight to eleven is three per cent. Apparently the greatest progress in the use of the noun clause is between grades five and eight. So also the adjectival clause: it increases seven per

cent from grade five to eight, and four per cent from eight to eleven.

TABLE II
COMPARISON OF THE PERCENTAGE OF SUBORDINATE
CLAUSES IN GRADES FIVE, EIGHT, AND ELEVEN
(PERCENTAGE BASED ON NUMBER OF SENTENCES)

Type of clause	Grade five	Grade eight	Grade eleven
Noun	8.8	14.4	17.4
Adjective	2.1	9.3	13.3
Adverb	26.3	36.0	33.4
Total	37.2	59.7	64.1

The adverbial clause increased by almost ten per cent from five to eight, then declined by almost three per cent from grade eight to eleven. In grades eight and eleven the pupils are writing a greater percentage of noun and adjectival clauses; therefore, there is a decrease in the use of the adverbial clause. This is in accordance with the previously mentioned Frogner study. The present study indicated that the decrease in writing adverbial clauses is almost the same as the increase in the writing of relative clauses. This appears to indicate that as the student learns new methods of subordination, his writing of adverbial clauses decreases, and his writing of noun and adjective clauses increases.

Stylistic Devices

Table III indicates that there is an increase from grade to grade in frequency of writing of all the stylistic devices, except the appositive. The growth presents a very interesting picture as grade eight students in this study write (excepting the parenthetical construction) approximately twice as many of the selected devices as the pupils in grade five. The students in grade eleven compared with the ones in grade eight write between four and five times as many words in series, parallel locutions, and parenthetical words and phrases, and over twice as many participles and slightly fewer appositives.

The total frequency in each grade indicates that twice as many of these devices are found in grade eight themes as in those of grade five, and three times as many in the grade eleven themes as in those of grade eight.

Listing the stylistic devices written in each grade, in rank order from the highest to the lowest, also presents an interesting development. This has been done in Table IV.

TABLE III
COMPARISON BY PERCENTAGES OF STYLISTIC DEVICES
IN GRADES FIVE, EIGHT, AND ELEVEN

Categories	Grade five	Grade eight	Grade eleven
Words in Series	1.4	2.2	10.9
Parallelism	1.1	2.6	11.4
Appositive	1.1	2.3	1.9
Participial	4.7	9.0	21.2
Parenthetical	0	1.6	7.0
Total	8.3	17.7	52.4

TABLE IV
POSITION OF DEVICES IN ORDER OF FREQUENCY
FROM HIGHEST TO LOWEST

Grade Five	Grade Eight	Grade Eleven
Participle	Participle	Participle
Words in series	Parallelism	Parallelism
Parallelism and Appositive	Appositive	Words in series
	Words in series	Parenthetical
	Parenthetical	Appositive

In this analysis the participial phrase has the highest frequency in all the grades. In the grade eight themes the words in series and in apposition were written with almost equal frequency.

Summary

1. The frequency of use of the compound sentence diminished from grade five to eleven.
2. The compound sentence was poorly constructed in all the grades under study.
3. The simple sentence decreased between grades five and eight, and increased between grades eight and eleven.
4. In order of frequency of use, the type of clause followed the same pattern in all the grades: adverbial, noun, adjectival.
5. The frequency of the periodic and balanced sentences was so low as to be inconsequential in all grades.

6. Grade five students used very few of the stylistic devices studied. The use of these devices doubled in grade eight and trebled from grade eight to grade eleven.
7. The run-on sentence error was prevalent in all grades.
8. Sentence fragments decreased from grade to grade.
9. Grade eight students presented the greatest inconsistencies. They wrote the largest number of complex, periodic, and run-on sentences, and the smallest number of simple sentences.

Suggestions

1. It appears that the teaching of compound sentences could be emphasized in the grades between five and eight. That the pupil could master this is evident from the fact that greater growth in the use of clauses is shown between grades five and eight than between grades eight and eleven.
2. Since grade eleven students seem to use the participial phrase well, and since this is usually used as the modifier of the subject, it is reasonable to suppose that this could be extended to include the use of the periodic sentence.
3. The greatest growth in the use of the stylistic devices is between grades eight and eleven, with comparatively little improvement between grades five and eight. It appears that some of these devices could be taught in the grades between five and eight.

REFERENCES

- (1) Buxton, Earl William. "An Experiment to Test the Effects of Writing Frequency and Guided Practices Upon Students' Skill in Written Expression." Unpublished Ph.D. dissertation, Stanford University, Stanford, California, 1958.
- (2) Commission on the English Curriculum. *The English Language Arts in the Secondary School*. New York: Appleton-Century-Crofts Inc., 1956.
- (3) Cross, E. A. and E. Carney. *Teaching English in High Schools*. Revised Edition; New York: The Macmillan Co., 1950.
- (4) Dakin, Dorothy. *How to Teach High School English*. Boston: D. C. Heath and Co., 1947.
- (5) Dawson, Mildred A. "Summary of Research Concerning English Usage." *Elementary English* 28: 141-47, March, 1951.
- (6) DeBoer, J. J. (editor). *Review of Educational Research*. Vol. XXV, No. 2. Washington: National Education Association, 1955.
- (7) Godwin, L. R. "An Analysis of the Sentence Structure and Paragraph Writing of the City of Calgary Students in Grade V, VIII, and XI." Unpublished Master's thesis, The University of Alberta, Edmonton, Alberta, 1955.
- (8) Kierzek, John M. *The Macmillan Handbook of English*. New York: Macmillan Company, 1954.
- (9) Lyman, R. H. *Summary of Investigations Relating to Grammar, Language, and Composition*. Chicago: University of Chicago, 1929.
- (10) Mirrieles, L. B. *Teaching Composition and Literature in Junior and Senior High School*. Harcourt, Brace and Co., 1952.

- (11) Munroe, W. S. (editor). *Encyclopedia of Educational Research. A Project of the American Educational Research Association*. New York: The Macmillan Co., 1950.
- (12) Perrin, Porter G. *Writer's Guide and Index to English*. Chicago: Scott, Foresman and Company, 1950.
- (13) Pooley, R. C. *Teaching English Usage*. New York: D. Appleton-Century Co. Inc., 1946.
- (14) Shane, Harold G. *Research Helps in Teaching the Language Arts*. Washington: Association for Supervision and Curriculum Development, National Education Association, 1955.
- (15) Shane, Harold G. "Teaching the Language Arts," *National Educational Association Journal*, 44:403, October 1955.
- (16) Smith, D. V. "Growth in Language Power as Related to Child Development," *The Forty-third Yearbook of the National Society for the Study of Education. Part II. Teaching English in the Elementary School*. Chapter IV. 1944.
- (17) Ward, C. H. *Grammar and Composition*. Chicago: Scott, Foresman and Co., 1933.

WHEN IS GRADE REPETITION MOST PROFITABLE?

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A number of elementary school children still experience grade repetition each year (4). Yet little is known about the kind of social, personal and instructional conditions under which "repeaters" may be expected to profit most. The present study seeks to provide information which may serve to guide school workers in their treatment of such slow-progress or under-achieving children.

Problem

This exploratory study sought to determine the extent to which differences in the amount of gain in achievement among students who repeat a grade in the elementary school is influenced by various social-personal and instructional variables.

Method

Subjects

The subjects of the investigation were sixty-six students who repeated the third grade in forty-five classrooms in a large urban school system in Alberta. They were divided into two groups—those who gained most and those who gained least—on the basis of an observed binodal distribution of gain grade scores in total achievement derived from the California Achievement Test, Primary, administered prior to the promotional decision and at the end of the year of repetition. The "gained-most" group consisted of twenty-eight students with a mean grade score gain of .79 and a standard deviation of .26, while the "gained-least" group was made up of thirty-eight students with a mean grade score gain of .34 and a standard deviation of .15.

Variables Observed

The influence of twenty-three variables on gain in achievement was observed. Eleven of these variables including sex, age, I.Q., frequency of choice as a desirable and undesirable work and play companion, absence, transiency, health, and home conditions were classified as *social-personal* variables. The other twelve including teacher continuity, teacher training, teacher experience, class size the use of supplementary materials in reading, language, arithmetic, and

spelling, small group instruction, individual instruction, the use of incentives, rewards, and punishments, and special treatment (e.g. referral to auxiliary services or special teachers) were classified as *instructional* variables.

Information regarding frequency of choice as a desirable and undesirable work and play companion was secured from a socio-metric test administered to all pupils in the classroom in which the subjects of the investigation were enrolled. I.Q. was measured by the California Short-Form Test of Mental Maturity, Primary. A questionnaire completed by each student's teacher, and official school records, provided data regarding the other social-personal and instructional variables examined.

Data Analysis

When the various null hypotheses of no differences between the gained-most and gained-least groups were tested, using the t-test, the Median test, and the x^2 test, the .05 level was adopted for significance in each instance. For purposes of this analysis, independence among variables was assumed.

Findings With Respect to Social-Personal Variables

Sex

The gained-most group consisted of twenty boys (71%) and eight girls (29%), while the gained-least group was made up of twenty-seven boys (71%) and eleven girls (29%).

Age

Table I shows the characteristics of the two groups with regard to chronological age. The students in the gained-most group were, on the average, four months older than those in the gained-least group. Application of the t-test revealed a statistically significant difference in age in favor of the gained-most group.

TABLE I
COMPARISON OF GAINED-MOST AND GAINED-LEAST
GROUPS WITH REGARD TO CHRONOLOGICAL AGE,
I.Q., DAYS ABSENT, AND CLASS SIZE

Characteristic	Chronological		Days Absent	Class Size
	Age in Months*	IQ*		
Mean of gained-most group	110.3	92.2	7.7	33.5
Mean of gained-least group	106.1	96.5	7.4	31.9
Standard deviation for gained-most group	6.9	10.9	10.6	2.5
Standard deviation for gained-least group	5.4	12.2	6.1	3.5
Observed value of t	+2.55	−1.75	+ .13	+1.35

(Critical value of t with 65 degrees of freedom $\pm$ 1.67)

*As measured at the time of the promotional decision.

I.Q.

The characteristics of each group with regard to IQ is also indicated in Table I. Students in the gained least group scored, on the average, about four points higher than those in the gained-most group. Application of the t-test revealed a statistically significant difference in IQ in favor of the gained-least group.

Health

In the opinion of their teachers the achievement of three (11%) of the gained-most group was affected by health factors (e.g. poor vision, deafness, poor diet, etc.), whereas the achievement of seven (18%) of the least-gained group was judged to be affected in this way. (χ^2 test—not significant)

Transiency

Twenty-three (82%) of the gained-most group spent the entire year of repetition in the same classroom, as compared with thirty-five (92%) of the gained-least group. (χ^2 test—not significant).

Home Conditions

In the opinion of their teachers the achievement of eight (29%) of the gained-most was affected by home or family conditions (e.g. health or decease of parents, economic status, sibling relationships, etc.). The achievement of nine (24%) of the gained-least group was judged by their teachers to have been affected by home conditions. (χ^2 test—not significant).

Absence

As is shown in Table I, application of the t-test detected no statistically significant difference between the two groups with regard to number of days absent from school. Students in the two groups were absent, on the average, about seven days during the year of repetition with greatest variability in the attendance of the gained-most group.

Desirability as a Work Companion

Sixteen (57%) of the gained-most group were chosen by three or more classmates as desirable work companions, while sixteen (42%) of the gained-least group were so chosen. (Median test—not significant).

Desirability as a Play Companion

Among the students who gained most during the year of repetition, thirteen (46%) were chosen by three or more classmates as a desirable play companion. Among those who made least gain, fifteen (39%) students were accorded this reception by their classmates. (Median test—not significant).

Undesirability as a Work Companion

Ten (36%) students in the most-gain group were singled-out by three or more classmates as persons they would least like to work with. Eighteen (47%) students in the least-gain group were similarly designated. (Median test—not significant).

Undesirability as a Play Companion

Fourteen (50%) students in the most-gain group were listed by three or more of their classmates as persons they would least like to play with. Twenty-two (58%) students in the least-gain were so listed by their classmates. (Median test—not significant).

Findings with Respect to Instructional Variables

Teacher Continuity

All of the gained-most group experienced their year of grade repetition with a teacher different from the one that they were with the previous year. Thirty-four (89%) of the gained-least group had the same experience. (χ^2 test—not significant).

Teacher Training

Fifteen (54%) students in the gained-most group were taught by a teacher with two or more years of training, while fifteen (39%) of the least-gain group had a teacher with this amount of training. (Median test significant).

Class Size

The mean class size for the gained-most group was 33.5, with a standard deviation of 2.5. For the gained-least group the mean class was 31.9, with a standard deviation of 3.5. As shown in Table I, application of the t-test detected no statistically significant difference between the two groups.

Small Group Instruction

Teachers of nineteen (68%) students in the gained-most group reported giving them special instruction in a small group setting during the year. Thirty (79%) students in the least-gain group were given similar instruction. (χ^2 test—not significant).

Individual Instruction

Teachers reported that fifteen (54%) of the gained-most group were given special instruction or assignments which required them to work separately from their classmates. Nineteen (50%) of the least-gain group were also treated in this fashion. (χ^2 test—not significant).

Use of Incentives, Rewards, and Punishments

For eight (29%) students in the gained-most group their teachers

claim to have employed special incentives, rewards and punishments (e.g. progress charts, detentions, special privileges, etc.). Teachers of sixteen (42%) members of the gained-least group reported similar practices. (x^2 test—not significant).

Use of Supplementary Materials

Application of the x^2 test revealed no statistically significant difference between the groups with regard to teacher use of supplementary learning materials (materials which were not commonly provided for all pupils) in language, arithmetic, spelling, and reading. In fact, only two teachers out of forty-four reported making use of supplementary materials in arithmetic, one reported their use in language, and none reported their use in spelling. In reading, however, teachers reported using supplementary materials with 10 (36%) students in the gained-most group, and with thirteen (34%) in the gained-least group.

Special Treatment

Only two (7%) of the gained-most group and four (11%) of the gained least group were provided with any other special treatment such as referral to auxiliary services, work with special teachers, etc. (x^2 test—not significant).

Discussion

The findings suggest that two of the variables examined—IQ and chronological age—are related to differences in the amount of gain in achievement exhibited by repeaters at the third grade level. Older students of lower IQ appeared to profit more from grade repetition than their relatively younger counterparts with a higher IQ.

The fact that greater benefits from grade repetition accrue to students of low intelligence has also been observed by Steadman (3). An explanation for this may lie in the nature of the educational treatment accorded students during their year of repetition. Teachers in this investigation reported using few, if any, supplementary materials in an effort to individualize instruction at the point of error for those students who were spending their second year in grade three. As a result, the repeaters' educational program likely consisted of the repetition of partially-learned material in lock-step fashion with the rest of the class. And the lower the intelligence of a student the greater the likelihood that he will react favorably to such treatment and find it stimulating rather than boring (2). If the educational treatment of repeaters were altered, and the amount of individualized instruction increased, however, a different relationship between IQ and achievement might be noticed.

Present practice, as reflected in the marked decline in over-agedness among elementary school children in recent decades, is to promote rather than retard older students. However, the findings of this study suggest that at least some relatively older students may prosper under conditions of grade repetition. This may be due more to a maturation or rate of growth factor than to chronological age itself. Nonetheless, the results draw attention to the need for school workers to consider a student's total developmental pattern when making promotional decisions rather than simply applying some arbitrary age criterion as is sometimes recommended (1).

It is interesting to note that the gained-most group tended to be taught by the better trained, more experienced teachers. While no statistically significant relationship was observed, the difference in the sample medians were in this direction. This fact, plus just plain "common sense", indicates that whenever possible school administrators should assign repeaters to their best trained and most experienced teachers.

It is also interesting to note that the majority of the variables observed in the study appeared to have little influence on the differences in the amount of gain in achievement evidenced by students during their year of repetition. While the lack of significant relationships may simply reflect errors in measurement, it may also be an indication that these variables are not of crucial importance in influencing student performance under conditions of grade repetition. Further research is needed to determine if this is so.

Conclusions

The findings of this exploratory study give rise to the following three hypotheses or guides to action:

1. Gain in achievement among students who repeat a grade will tend to vary inversely with their intelligence.
2. Gain in achievement among students who repeat a grade will tend to vary directly with their chronological age.
3. Gain in achievement among students who repeat a grade will tend to vary directly with the amount of training and experience of their teacher.

REFERENCES

1. Alberta Department of Education, *Promotion Policies Report*. Edmonton—Queen's Printer, 1957, p. 7.
2. Smith, H. P., and Dechant, E. V., *Psychology in Teaching Reading*. Englewood Cliffs—Prentice-Hall, 1961, p. 62.
3. Steadman, E. R., "Fifteen Who Were Not Promoted". *Elementary School Journal*, 49 (February, 1959), 271-76.
4. Worth, W. H., "What Research Says About Promotions". *Canadian Education*, 15 (September, 1960), 61-70.

ATTITUDES TOWARDS TECHNICAL ELECTIVES

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In an effort to meet the educational needs of a heterogeneous high school population the composite high school has emerged with technical courses included in its program. There is some evidence that the purpose for which the technical courses were introduced is not being served. They appear to be largely a "dumping ground" for students of low ability, and seldom form the basis for pre-vocational or vocational training. Moreover, relatively few students ever follow the technical route throughout their senior high school careers.

Does this apparent lack of success of the technical electives reflect the influence of certain attitudes of students, parents, and educators towards such courses? If so, what effect do these attitudes have upon the status of technical electives, student enrolment, and school policies? The present article reports on a study (1) which sought partial answers to these questions.

Purpose of the Study

The purpose of this study was to ascertain the attitudes of students and adults towards the senior high school technical electives and to determine the probable effects of such attitudes upon the shop program.

Procedure

The study was limited to the three composite high schools in a large urban school system in Alberta. The respondent groups consisted of all of the Grade XI boys attending the three composite schools in April, 1960, the total teaching and administrative staffs at these schools, and the fathers of all the Grade XI boys. To facilitate comparisons these groups were divided into a number of sub-groups. Boys were classified as "shop boys" and "non-shop boys"; staff members as administrators and/or guidance personnel, academic teachers, business education teachers, and shop or home economics teachers; and fathers as professional, managerial, industrial-technical, and others.

Data were obtained in the form of responses to twenty-one items on an opinionnaire. A total of 959 completed opinionnaires were returned, the total consisting of 564 from Grade XI boys, 125 from school staffs, and 270 from fathers. Responses to items or statements on the opinionnaire took the form of circling letter codes SA, A, U, D, SD, meaning Strongly Agree, Agree, Undecided,

Disagree, and Strongly Disagree. Each type of response for each item was given a quantitative value computed on the basis of an assumption that responses were normally distributed and presented a "typical" aggregate answer (2). Favourability, then, towards an item or a series of items was determined through the product of frequencies and response values and expressed by a score.

Findings

Scores relating to general favourability or social acceptance indicated that, of the sub-groups, only the shop and home economics teachers, the boys with shop experience, and the counsellor-administrator sub-group, evince a favourable attitude towards technical electives. The least degree of favourability is shown by professional fathers, the academic teachers, and boys with no shop experience.

Scores relating to prestige indicated that the Grade XI boys and the staff members accord the shop program favourable recognition or prestige, while the parents attach significantly less prestige to it. The only sub-groups indicating favourable prestige were, in order, the shop and home economics teachers, the administrators and/or guidance counsellors, and the shop boys. The least regard for the shop program was shown by the boys with no high school shop experience. There appeared to be an indication, too, that higher prestige was accorded the shop program for its suitability than for the difficulty or challenge involved. In other words, the challenge to students seemed to be considered inadequate in view of the nature and extent of the subject matter.

Results of the opinionnaire survey pointed to certain factors that should have a favourable influence upon shop enrolment. Boys in senior high school, according to the responses of the Grade XI boys, find the shop subjects more interesting than academic subjects. Students regard the technical subjects as sufficiently challenging to maintain interest but not so difficult as to cause undue dropout. Other results, however, pointed to certain factors that would adversely influence enrolment in technical electives. Most respondents agreed that parents do urge their sons to follow a matriculation pattern regardless of interest or aptitude. Although there was little definite support and some opposition among sub-groups regarding a policy of guiding able students towards academic subjects even if the students showed interest in technical study, the comparatively low scores of the academic teachers and administrators and/or guidance counsellors, indicated that they would tend to support such a policy. Thus there is likely a school influence as well as a home influence tending to divert able students away from the shop program. There was general agreement among respondents that the

enrolment in technical courses would increase if the program had a closer connection with further technical training. There was general agreement, too, that if these courses were represented on the matriculation program they would be as acceptable as other matriculation subjects.

Five of the opinionnaire items were used to determine attitudes towards the content of the shop courses, their vocational training value, their suitability as supplementary courses in the science and mathematics program, and their suitability as a high school offering. All sub-groups agreed that shop subjects are not "frills" that divert students from serious high school learning. The suggestions to increase the theoretical content and decrease the practical content of the shop courses brought a divergence of opinions. Boys with shop experience expressed firm opposition. Counsellors and administrators were also somewhat opposed, while shop and home economics teachers were undecided with an inclination to favour more theory. Views on the industrial-vocational value of technical electives as compared with the academic subjects were inconclusive, but there was an inclination towards favouring the academic program as a means of providing a better opportunity for industrial employment. Little support was given to the suggestion that shop courses be designed to assist in the mathematics and science fields. The proposal to remove the shop program from the senior high school to other institutions received considerable opposition from the boys, and a lesser degree of opposition from the fathers. On this issue, staff sub-groups differed widely. The shop and home economics teachers and the counsellor-administrator staff members showed disfavour. All others offered no definite support or opposition. However, general support was given the suggestion to give shop subjects matriculation status.

Conclusions

On the basis of these findings it seems reasonable to draw the following conclusions:

1. Since the opinionnaire study revealed attitudes more of indifference than of favourability towards the shop program, it appears that school boards would receive almost as much support as opposition to a proposal to remove the technical electives from the senior high school curriculum. Results of the study suggest that the group most opposed to discontinuing the shop program would be the boys in high school.

2. Groups showing least favour towards the technical electives are those having the least experience or contact with the program. These included fathers in professional occupations, teachers of academic subjects, and boys who do not elect shop subjects.

3. Although the professional literature suggests that the shop program suffers from low prestige, responses to that portion of the opinionnaire directly related to prestige did not uphold this view. Technical electives appear to the respondents to be better than "frills", and suitable in subject matter for high school study, but, according to fathers and academic teachers, somewhat deficient in challenge to students. However, since those respondents with least knowledge of the shop program showed least favour or support, it seems reasonable to infer that low prestige may be a factor influencing their attitudes.

4. Although the high interest shown by the Grade XI boys should maintain high enrolment in technical subjects, enrolment statistics indicate that enrolment is relatively low in second and third year units. The causes of this drop in enrolment include (a) the tendency for parents to urge their sons to follow a matriculation pattern, and the inclination of academic teachers, counsellors and administrators to direct able students towards an academic program, (b) the terminal nature of the high school shop program, in that the courses are not recognized as credits towards further technical study beyond the high school, and (c) the fact that technical electives are not accepted as matriculation subjects.

5. Minor recognition is given to the industrial vocational or pre-vocational value of technical electives. The respondent sub-groups considered most competent to evaluate this aspect, the counsellors-administrator staff members, and fathers in managerial and in industrial-technical occupations, appear to believe that the shop courses are of lesser value than academic courses as preparation for industrial employment. However, the opinions may be based, not only on the comparative vocational value of these programs, but also on the fact that the more able students follow the academic route.

6. A generally favourable attitude exists towards the idea of testing and classifying students for the purpose of placing them in various programs—academic, home economics, technical, and business education. Grade XI boys and administrators and counsellors, however, did not support such a streaming policy.

7. The inclusion of a five-credit shop course on the list of matriculation subjects would receive general approval, with probably as much opposition as support from the teachers of academic subjects and from the administrators and counsellors.

8. A change in the presentation of technical electives to place greater emphasis on the theoretical approach and less on the practical or project approach, would be approved by the teachers of these subjects but would be opposed by the students.

Recommendations

The findings and conclusions of this study give rise to the following recommendations:

1. An analysis should be made of the content of various shop courses and the methods and administrative peculiarities connected with the shop program in order to determine the feasibility of recognizing these courses through the Grade XII external examinations and their acceptance for matriculation. Such recognition would likely enhance their popularity with able students, increase their prestige and social acceptance, and assist in upgrading the technical program.

In connection with the foregoing recommendation, the following suggestions may have merit:

(a) Consider reducing the number of credits, or the time allotted for these subjects, from eight or ten credits to five credits as for academic courses. This would likely provide more flexibility in timetabling, extend or improve opportunities for subject choice, and accomplish an alignment with other programs of the composite school.

(b) Consider reducing the practical or project aspect so that the technical courses, especially those of the second and third year units, would be concerned largely with theory, principles, problem solving, and demonstrations. The technical courses would thus be made more specific and likely more demanding and in a better position to be included in an external examination system and in a matriculation program. However, it would be reasonable to retain sufficient practical work to enable students to develop elementary or basic skills.

(c) Investigate the possibility of placing the third year units of the technical electives on the list of "departmentals" if such external examination policy is maintained. Successful achievement in these courses could be considered prerequisite to enrolment in the technical schools of Alberta or as preferred admission qualifications. These courses, perhaps, might also be recognized as university matriculation courses in such faculties as Education, Engineering, and Agriculture. It is conceivable that such matriculation subjects could, for example, be "technology 30", a composite type technical course, or "mechanical technology 30", or "electrical technology 30".

The foregoing suggestions for a more theoretical approach relating chiefly to the second and third year units of senior high school technical electives, could apply also to the first year units. Or, in high schools where physical facilities permit, a more practical or

project type approach may be applied to first year units. The performance in the first year courses with a testing program to determine interests and aptitudes could well be a basis for counselling and the selection of appropriate courses for individual programs in subsequent years.

2. A study should be made of the effects of a change to a more theoretical presentation of technical courses. Would such approach to the study of technical courses discourage enrolment of students who show great interest in the activity or project phase of those subjects but who find it difficult to cope with technical theory and its application? Would the first year units in the various technical courses be adequate for students interested chiefly in projects or hand work? Students who cannot benefit from theoretical knowledge, or students whose interests are confined to one type of study, automotives for example, would perhaps find specific and specialized job training more to their benefit. Could this be obtained more effectively through Canadian Vocational Training and apprenticeship plans? If the more demanding theoretical study leads to improved status for the technical subjects and promotes social acceptance and prestige, would it not encourage participation by able students interested in this field of learning and serve more effectively in composite high school education?

3. Before program revision is undertaken, the purpose of the technical program in the senior high school should be reviewed to determine to what extent it should involve vocational training. Should the major purpose of the senior high school technical program be vocational, that is, should the aim be the development of skills acceptable to the trades? Or should the major purpose be to teach technical electives as a part of general education, as another field of study for development of skills, knowledges, and values, and for the avocational, pre-vocational, or practical competence of the ordinary citizen?

A number of issues are involved in a decision to offer vocational technical courses in high school. Would the vocational objective agree with an apparent major purpose of the high school to provide a fundamental education leading towards further study? Could such training programs keep aligned with constant changes in technology? Would the vocational aim in the technical program maintain or accent the present division between the academic and shop programs, thereby encouraging the view that shop subjects are not suitable for capable students? In order to establish and support classes in specific trades, would sufficient numbers of students in high school be prepared to decide on a definite vocation?

The general education function of the technical subjects may be somewhat difficult to assess. But, at least in theory, this aim or approach should lead to a closer connection with other types of courses, greater flexibility in timetabling, more substance and meaning for individualized programing, and increased participation by students with non-vocational intentions. This could mean that the technical subjects, as a recognized part of a general and broad senior high school curriculum, might be of greater benefit to more students, and might better serve the function and philosophy of the composite high school.

REFERENCES

1. Carran, R. C. "A Study of Student and Adult Attitudes Towards the Technical Electives Program in Edmonton Composite High Schools". Unpublished M.Ed. thesis, University of Alberta, 1961.
2. Garrett, H. S. *Statistics in Psychology and Education*. New York; Longmans, Green and Company, 1958, pp. 323-327.

BOOK REVIEW

Lawrence Cremin. *The Transformation of the School. Progressivism in American Education 1876-1957.* New York: Alfred A. Knopf, 1961.

It is gratifying to note the appearance recently of some books by historians and philosophers who through detached scholarly research try to shed light on current issues in education. For example, *The Language of Education*, 1959, by the philosopher Israel Scheffler represents an effort to clarify concepts in education by an analytic method. A different approach is used by historian Cremin in his recent book *The Transformation of the School*. Cremin traces the progressive education movement in the United States from its origin in the late 19th century, through its heyday in the 1920's and 1930's to its collapse in the 1950's.

Cremin's research leads him to the conclusion that progressive education was part of a larger social and political movement. For example, the trend to offer some form of vocational education in the schools was supported before World War I by labor groups and manufacturers' associations and was given impetus by financial support from federal government. Similarly there were community pressures to have the school broaden its program to include concern for health, family life, and civic responsibilities. The schools felt the impact of the Settlement House (e.g. Jane Adams' Hull House in Chicago) with its stress on health, social problems, and fine arts. As waves of immigrants poured into the new continent the schools were called upon to transform the immigrants with attention to health, manners and moral codes. In rural areas the movement to improve the lot of the farm population took the form of school fairs, school gardens, and nature study. Having shown the close relation existing between "social reform" and "reform of education", Cremin concludes that the community influences which sought to use the schools to carry out social reforms inevitably transformed the schools in the process.

Cremin devotes a large part of his report to the theoretical side of the progressive education movement. Some proponents of progressive education found justification for using the schools as a lever of social change in the dynamic sociology of Lester Frank Ward and in the pragmatist theories of William James and John Dewey. Others within the movement (and especially in the late 20's) advocated a "child-centered" school, presumably in accord with Rousseauan philosophy and Freudian psychology. The titles of

some of the chapters in the book indicate the range of viewpoint within the movement: one chapter is entitled "Science, Darwinism, and Education"; another has the heading "Scientists, Sentimentalists, and Radicals". Apparently progressive education was bedevilled by conflicting ideologies within the movement throughout most of its history.

Cremin tells the story of the Progressive Education Association from its beginning in 1919 to its demise in 1955. The official organ of the Association entitled *Progressive Education* ceased publication in 1957. The author suggests that the Association followed the pattern of social movements generally—through stages of initial group fervor, formal organization, institutionalization, and finally inflexibility and bureaucracy. "To what extent", Cremin asks, "did the Progressive Education Association incarnate the progressive education movement?". To ask the question, he answers, "is to ponder what the church is to religion, what the party is to ideology."

It is author Cremin's belief that progressive education helped to transform the schools, both for better and for worse—but with the good probably outweighing the harm. He concludes, "The transformation of the school was in many ways as irreversible as the larger industrial transformation of which it had been a part."

What of the progressive education movement in Canada? Has the pattern been the same as that described in Cremin's book? There is a challenge to do historical research here. Although there has never been a Progressive Education Association in Alberta, there was undoubtedly in the 1930's an educational reform movement in the Province which formed part of a larger political and social reform movement.

Canadian readers will likely find excessive detail in Cremin's book. The copious footnotes and extensive bibliographies add to the scholarly quality of the work, but will be of interest to a few only. All readers should find this book helpful in placing the progressive education movement in historical perspective.

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